

WHAT IS CLAIMED IS:

1. A compressible fluid supply path structure,
said compressible fluid supply path structure being of
a convergent-divergent nozzle type,

5 said compressible fluid supply path structure
comprising:

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824* a fluid inlet into which a compressible fluid is
made to flow;

10 a throat portion for controlling said compressible
fluid to a speed less than a sound speed;

 a fluid outlet of which said compressible fluid is
made to flow out; and

15 a circulation system for circulating said
compressible fluid flowing out of said fluid outlet,
into said fluid inlet.

2. The compressible fluid supply path structure
according to Claim 1, wherein a ratio of a pressure at
said fluid inlet to a pressure at said fluid outlet is
20 not less than a ratio of critical pressures.

3. The compressible fluid supply path structure
according to Claim 1, which is shaped so as to decrease
disturbance caused by said compressible fluid.

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4. The compressible fluid supply path structure
according to Claim 1, which is a structure without an

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vertical width adjusting means for adjusting a

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13. A compressible fluid supply method

comprising:

a step of making a compressible fluid flow into a fluid inlet of a compressible fluid supply path structure of a convergent-divergent nozzle type;

5 a step of controlling said compressible fluid to a speed less than a sound speed, at a throat portion of said compressible fluid supply path structure;

10 a step of making said compressible fluid flow out of a fluid outlet of said compressible fluid supply path structure; and

a circulation step of circulating said compressible fluid flowing out of said fluid outlet, into said fluid inlet by a circulation system.

15 14. The compressible fluid supply method according to Claim 13, wherein said compressible fluid supply path structure is arranged so that a ratio of a pressure at said fluid inlet to a pressure at said fluid outlet is not less than a ratio of critical
20 pressures.

15. A compressible fluid supply method comprising:

25 a step of making a compressible fluid flow into a fluid inlet of a compressible fluid supply path structure;

a step of controlling said compressible fluid to a

a throat portion for controlling said laser gas to

a speed less than a sound speed; and

a fluid outlet of which said laser gas is made to flow out.

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18. The laser oscillating apparatus according to Claim 17, which comprises:

said gas supply path structure for supplying said laser gas,

said gas supply path structure further comprising:

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a circulation system for circulating said laser gas flowing out of said fluid outlet, into said fluid inlet.

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19. The laser oscillating apparatus according to Claim 17, which comprises:

said gas supply path structure for supplying said laser gas,

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said gas supply path structure being arranged so that a ratio of a pressure at said fluid inlet to a pressure at said fluid outlet is not less than a ratio of critical pressures.

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20. The laser oscillating apparatus according to Claim 17, wherein said laser gas is an excimer laser gas which is a mixture of F_2 gas with at least one inert gas selected from Kr, Ar, Ne, and He.

21. The laser oscillating apparatus according to Claim 17, which comprises:

said gas supply path structure for supplying said laser gas,

5 said gas supply path structure being a structure without an inflection point.

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22. The laser oscillating apparatus according to Claim 17, which comprises:

10 said gas supply path structure for supplying said laser gas,

 said gas supply path structure further comprising:
 at least one pressure correcting means for
15 correcting a pressure at said fluid inlet or at said fluid outlet.

23. The laser oscillating apparatus according to Claim 17, which comprises:

20 said gas supply path structure for supplying said laser gas,

 said gas supply path structure further comprising:
 at least one temperature correcting means for
 correcting a temperature at said fluid inlet or at said
 fluid outlet.

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24. The laser oscillating apparatus according to Claim 23, which comprises:

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wherein said temperature correcting means has a cooling function and wherein said cooling is effected near said fluid outlet.

said gas supply path structure for supplying said
laser gas,

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said gas supply path structure for supplying said laser gas,

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said gas supply path structure for supplying said laser gas,

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said gas supply path structure for supplying said laser gas,

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10 said gas supply path structure for supplying said
laser gas,

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a gas supply path structure group for supplying a laser gas, said gas supply path structure group being of a shape of gas supply path structures of a convergent-divergent nozzle type connected in series,

a central part for controlling said laser gas to a speed greater than a sound speed; and

25 a fluid outlet of which said laser gas is made to
flow out.

31. The laser oscillating apparatus according to Claim 30, which comprises:

5 said gas supply path structure group for supplying said laser gas,

said gas supply path structure group further comprising:

a circulation system for circulating said laser gas flowing out of said fluid outlet, into said fluid inlet.

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32. The laser oscillating apparatus according to Claim 30, wherein said laser gas is an excimer laser gas which is a mixture of F_2 gas with at least one inert gas selected from Kr, Ar, Ne, and He.

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33. The laser oscillating apparatus according to Claim 30, which comprises:

20 said gas supply path structure group for supplying said laser gas,

said gas supply path structure group being a structure without an inflection point.

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34. The laser oscillating apparatus according to Claim 30, which comprises:

said gas supply path structure group for supplying said laser gas,

said gas supply path structure group further

at least one pressure correcting means for correcting a pressure at said fluid inlet or at said fluid outlet.

35. The laser oscillating apparatus according to Claim 30, which comprises:

10 said gas supply path structure group further
comprising:

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36. The laser oscillating apparatus according to Claim 30, which comprises:

said gas supply path structure group for supplying
said laser gas,

20 said gas supply path structure group further
 comprising:

vertical width adjusting means for adjusting a vertical width of said central portion.

25 37. The laser oscillating apparatus according to
Claim 31, which comprises:

said gas supply path structure group for supplying

said laser gas,

wherein said circulation system is comprised of at least one bellows pump.

5 38. The laser oscillating apparatus according to Claim 31, which comprises:

said gas supply path structure group for supplying said laser gas,

10 wherein said circulation system is comprised of at least one circulating pump.

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39. The laser oscillating apparatus according to Claim 31, which comprises:

15 said gas supply path structure group for supplying said laser gas,

wherein said circulation system is comprised of at least one blower.

20 40. The laser oscillating apparatus according to Claim 31, which comprises:

said gas supply path structure group for supplying said laser gas,

wherein said circulation system is comprised of at least one Sirocco fan.

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41. An exposure apparatus comprising:

a laser oscillating apparatus, said laser

oscillating apparatus generating illumination light,
said laser oscillating apparatus comprising a gas
supply path structure for supplying a laser gas, said
gas supply path structure being of a convergent-
5 divergent nozzle type,

said gas supply path structure
comprising:

a fluid inlet into which said laser gas
is made to flow;

10 a throat portion for controlling said
laser gas to a speed less than a sound speed; and

a fluid outlet of which said laser gas
is made to flow out,

a first optical system for radiating said
15 illumination light from said laser oscillating
apparatus onto a reticle in which a predetermined
pattern is formed; and

a second optical system for radiating said
illumination light having passed through said reticle,
20 onto a surface to be irradiated.

42. An exposure apparatus comprising:

a laser oscillating apparatus, said laser
oscillating apparatus generating illumination light,

25 said laser oscillating apparatus comprising a gas
supply path structure group for supplying a laser gas,
said gas supply path structure group being of a shape

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comprised of gas supply path structures of a convergent-divergent nozzle type connected in series,

said gas supply path structure group comprising:

5 a fluid inlet into which said laser gas is made to flow;

a central part for controlling said laser gas to a speed greater than a sound speed; and

10 a fluid outlet of which said laser gas is made to flow out,

a first optical system for radiating said illumination light from said laser oscillating apparatus onto a reticle in which a predetermined pattern is formed; and

15 a second optical system for radiating said illumination light having passed through said reticle, onto a surface to be irradiated.

20 43. A method for producing a device, said method comprising:

a step of coating a surface to be irradiated, with a photosensitive material;

25 a step of effecting exposure of a predetermined pattern in said surface to be irradiated, coated with said photosensitive material, using the exposure apparatus as set forth in Claim 41 or 42; and

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